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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/669,825      | 09/23/2003  | Krishna Parat        | 42P13217D           | 5700             |

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Michael A. Bernadicou  
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
Seventh Floor  
12400 Wilshire Boulevard  
Los Angeles, CA 90025

EXAMINER

THAI, LUAN C

ART UNIT PAPER NUMBER

2829

DATE MAILED: 02/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                     |  |
|------------------------------|--------------------------------------|-------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/669,825 | <b>Applicant(s)</b><br>PARAT ET AL. |  |
|                              | <b>Examiner</b><br>Luan Thai         | <b>Art Unit</b><br>2829             |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 18-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This Office action is responsive to the amendment filed December 13, 2004.

Claims **18-41** are pending in this application.

Claims **1-17** have been canceled.

### *Double Patenting*

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

1. Claims 18-20 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 18-20 of prior U.S. Patent No. 6,849,518. This is a double patenting rejection.

Note that the words "self-aligned" and "perfectly aligned", as being defined by applicant, are in the same meanings (see applicant specification, paragraph [0018] and [0028]).

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

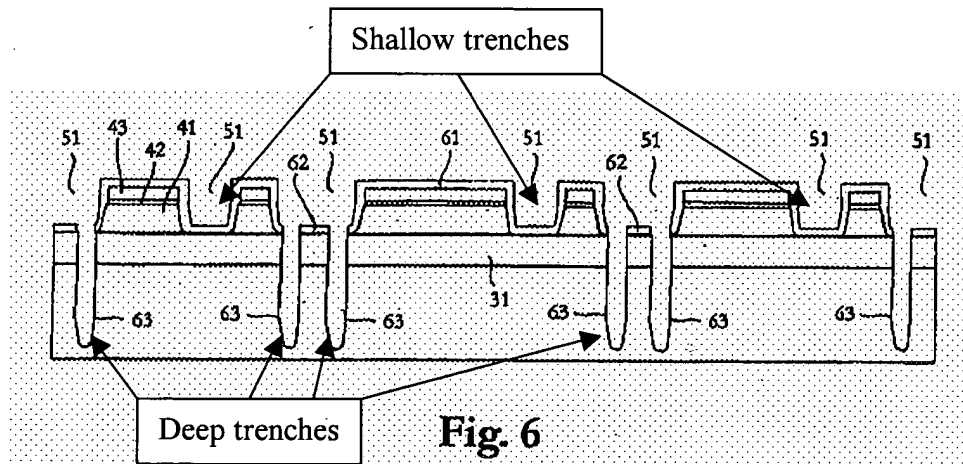
3. Claim 32 is rejected under 35 U.S.C. 102(b) as being anticipated by Akram (5,895,253).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

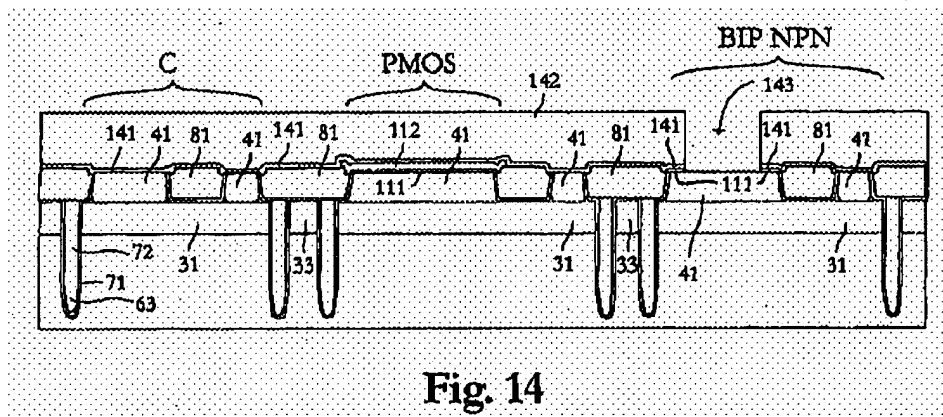
Regarding claim 32, Akram (see specifically figures 11, 14 and 16) discloses an apparatus comprising: a substrate (64) having self-aligned deep and shallow isolation trenches (112) and (82) respectively (see the Abstract).

4. Claims 18, 25-30, 32, and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Johansson et al. (US 2005/0020003).

Regarding claims 18, 25-30, 32, and 33, Johansson et al. (see specifically figures 6-11, 14 and 16) disclose an isolation structure comprising:



a first area and a second area; a plurality of shallow isolation trenches (51) in the first area; and a plurality of deep isolation trenches (63) in the second area, the deep isolation trenches and the shallow isolation trenches being self-aligned (claim 35 and claim 47), a thin thermal oxide (71) in the shallow trenches, and a trench fill material (81) in the shallow trenches (see figure 14).



Johansson et al. further disclose a mask layer formed on the first active layer and the mask layer comprising a pad oxide layer (42) and a nitride layer (43) (see figure 4a).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 18-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malik et al. (6,294,423) in view of Nishida et al. (6,461,934).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 18, 21-30, 32-33, and 36-41, Malik et al. disclose an isolation structure, comprising: a substrate (16) of monocrystalline silicon, the substrate comprising a first area (14) and a second area (12); a plurality of shallow isolation trenches (32) in the first area; and a plurality of deep isolation trenches (30) in the second area, wherein the widths of the shallow isolation trenches are less than the widths of the deep isolation trenches, and wherein the first area includes memory devices and the second area includes logic devices (Col. 4, lines 4-19). Malik et al. further disclose a thin thermal oxide in the shallow isolation trenches (Col. 1, lines 17+), a trench fill material (52) in the shallow isolation trenches, a mask layer comprising a pad oxide layer (20), a nitride layer (22), and an antireflective coating (24). Malik et al. do not explicitly disclose the deep isolation trenches and the shallow isolation trenches being self-aligned.

Nishida et al. while related to a similar structure design teach a method required only a single photolithography step to form both deep and shallow isolation trenches in a self-aligned manner, so that the manufacturing steps thereof are simple and easily adaptable to higher density of a device (Col. 3, lines 47+ and Col. 5, lines 7+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to recognize that combining Malik et al.'s invention with Nishida et al.'s method would have been beneficial (because Nishida et al.'s method helps the manufacturing steps to be simple and easily adaptable to higher density of a device).

Regarding claims 19-20, the proposed structure of Malik et al. and Nishida et al. discloses the claimed invention as detailed above except for the range of the depths of

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shallow trench and the deep trench (e.g., 1000Å to 2000Å and 3000Å to 6000Å, respectively).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the depths of the shallow trench and of the deep trench in the range 1000Å to 2000Å and 3000Å to 6000Å, respectively, as claimed because the dimension of the trench is an art recognized variable of importance which is subject to routine experimentation and optimization.

"Normally, it is to be expected that a change in depth would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." Note that the specification contains no disclosure of either the critical nature of the claimed depths of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen depths or upon another variable recited in a claim, the Applicant must show that the chosen depths are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQZd 1934, 1936 (Fed. Cir. 1990).

Regarding claim 31, although the proposed structure of Malik et al. and Nishida et al. does not teach a photoresist layer covering the first area and leaving the second area exposed, this limitation is taken to be a product by process limitation since it does not

appear in the final product, and it is the patentability of the claimed product and not of recited process steps which must be established. Therefore, when the prior art discloses a product, which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process ” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in “product by process” claim or not.

Regarding claims 34-35, although the proposed structure of Malik et al. and Nishida et al. does not explicitly disclose that the shortest distance between a shallow isolation trench and an adjacent deep isolation trench is greater than the allowed error (of about 150-300 nm) of a non-critical photolithography mask, this feature is considered to be obvious in the proposed structure of Malik et al. and Nishida et al. for the proposed structure to function as intended.

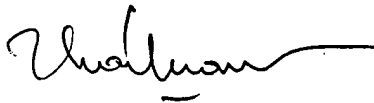
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is 571-272-1935. The examiner can normally be reached on 6:30 AM - 5:00 PM, Monday to Thursday.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**Luan Thai**  
Primary Examiner  
Art Unit 2829  
January 31, 2005